

changes made thereto, is attached in Appendix A. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

1. (Amended) An exposure apparatus to be used with an excimer laser as a light source, said apparatus comprising:

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an optical system disposed along a path of excimer laser light;

a chamber for accommodating said optical system therein and having an inside space being able to be replaced by a predetermined gas;

a gas circulation mechanism having a gas circulation path for connecting a gas discharging port for discharging a gas from said chamber and a gas supplying port for supplying a gas into said chamber; and

switching means for selectively using plural purifiers disposed in the gas circulation path.

2. An apparatus according to Claim 1, wherein said purifiers are disposed in parallel to each other in a portion of the gas circulation path.

3. (Amended) An apparatus according to Claim 1, further comprising a switching valve for selectively flowing the gas to one of upstream and downstream of said purifiers, and for selectively flowing the gas to any one of said purifiers.

4. An apparatus according to Claim 3, wherein said valve is operable to shut the gas flow to at least one purifier.

5. (Amended) An apparatus according to Claim 4, wherein said valve is operable to shut the gas flow to a purifier, which (i) is to be replaced by another or (ii) needs maintenance.

6. An apparatus according to Claim 3, wherein said valve is operable in response to a signal from a control system.

7. An apparatus according to Claim 1, further comprising a gas supply source for supplying a gas to said purifier, and a gas discharging mechanism for discharging gas from said purifier.

8. An apparatus according to Claim 7, wherein, on the basis of said switching means, a gas from said gas supply source is supplied to said purifier to which no gas is supplied from said chamber, and wherein, on the basis of said gas discharging mechanism, the gas is discharged from said purifier.

9. An apparatus according to Claim 7, further comprising a second valve for opening and closing a flowpassage between said gas supply source and said purifier.

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10. An apparatus according to Claim 7, wherein said gas supply source supplies an inactive gas to said purifier.

11. An apparatus according to Claim 10, wherein the inactive gas is one of helium and nitrogen.

12. (Amended) An apparatus according to Claim 7, wherein the supply of gas from said gas supply source is performed after (i) replacement of said purifier or (ii) maintenance of said purifier.

13. An apparatus according to Claim 7, wherein introduction of a gas of said chamber to said purifier is initiated in accordance with one of a gas flowing time of said gas supply source and an output of a gas detector.

14. (Amended) An exposure apparatus to be used with an excimer laser as a light source, said apparatus comprising:

an optical system disposed along a path of excimer laser light;

a chamber for accommodating said optical system therein and having an inside space being able to be replaced by a predetermined gas;

a gas circulation mechanism having a gas discharging port for discharging a gas from said chamber and a gas supply port for supplying a gas into said chamber;

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switching means for selectively using plural purifiers disposed in a portion of a gas circulation path; and

a bypass way for circulating the gas inside said chamber, without passing through said purifier.

15. An apparatus according to Claim 14, further comprising a third valve for changing flowpassages to said bypass way and said purifier.

16. An apparatus according to Claim 14, wherein said bypass way is used at least when said apparatus is started.

17. An apparatus according to Claim 1, wherein the gas from said purifier is supplied to a supply port while being temperature controlled.

18. An apparatus according to Claim 1, wherein said purifier has a function for removing oxygen.

19. (Amended) An apparatus according to Claim 1, wherein said purifier has a function for removing ozone.

20. An apparatus according to Claim 1, wherein said purifier has a chemical filter.

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21. An apparatus according to Claim 20, wherein said chemical filter is effective to remove an organic gas.

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22. (Amended) An exposure apparatus to be used with an excimer laser as a light source, said apparatus comprising:

first and second chambers for maintaining a predetermined gas ambience at a path of excimer laser light, wherein said second chamber is adapted to enclose a masking blade for defining an illumination range on a reticle; and

an optical member for spatially separating said first and second chambers from each other, and being transmissive to the excimer laser light,

wherein said optical member contains a fluorine compound glass.

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23. An apparatus according to Claim 22, wherein said first chamber has an optical integrator.

24. (Amended) An exposure apparatus to be used with an excimer laser as a light source, said apparatus comprising:

first and second chambers for maintaining a predetermined gas ambience at a path of excimer laser light, wherein said first chamber has an optical integrator;

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an optical member for spatially separating said first and second chambers from each other, and being transmissive to the excimer laser light, wherein said optical member contains a fluorine compound glass; and

a half mirror disposed between said optical integrator and said fluorine compound glass, wherein light reflected by said half mirror is detected to determine the light quantity.

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26. An apparatus according to Claim 22, wherein the fluorine compound glass uses one of CaF_2 , MgF_2 , SrF_2 and fluorine doped quartz.

27. (Amended) An apparatus according to Claim 22, wherein one of an F_2 laser and an Ar_2 laser is used as the light source.

28. An apparatus according to Claim 22, wherein said first and second chambers are controlled to different ambiances, respectively.

29. An apparatus according to Claim 28, wherein the ambiances inside said first and second chambers are controlled at different oxygen concentrations.

30. An apparatus according to Claim 28, wherein one of said first and second chambers is controlled to a helium ambience, and wherein the other is controlled to a nitrogen ambience.

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31. An apparatus according to Claim 22, wherein said first and second chambers enclose an optical element for forming an illumination optical system, and wherein said first chamber is disposed at the light source side while said second chamber is disposed at the projection optical system side.

32. An apparatus according to Claim 22, wherein, in said first chamber, an inactive gas is supplied thereinto from a gas supply port provided at one end of said first chamber while the inactive gas is discharged from a gas discharging port provided at the other end of said first chamber, such that inside said first chamber the gas flows along the light path.

33. An apparatus according to Claim 22, wherein, in said second chamber, an inactive gas is supplied thereinto from a gas supply port provided at one end of said second chamber while the inactive gas is discharged from a gas discharging port provided at the other end of said second chamber, such that inside said first chamber the gas flows along the light path.

34. An exposure apparatus to be used with an excimer laser as a light source, said apparatus comprising:

first and second chambers for maintaining a predetermined gas ambience at a path of excimer laser light;

an optical member for spatially separating said first and second chambers from each other, and being transmissive to the excimer laser light, wherein said optical member contains a fluorine compound glass; and

a third chamber for enclosing at least one of said first and second chambers.

35. An apparatus according to Claim 34, further comprising temperature adjusting means for supplying a temperature controlled gas to said third chamber.

36. An apparatus according to Claim 34, wherein a gas of a purity lower than that of the gas supplied to said first and second chambers is supplied to said third chamber.

37. An apparatus according to Claim 34, wherein a gas discharged from at least one of said first and second chambers is supplied to said third chamber.

38. An apparatus according to Claim 34, wherein helium is supplied to at least one of said first and second chambers, and wherein nitrogen is supplied to said third chamber.

39. An exposure apparatus to be used with an excimer laser as a light source, said apparatus comprising:

first and second chambers for maintaining a predetermined gas ambience at a path of excimer laser light; and

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a movable member for connecting said first and second chambers with each other, to secure gas tightness and to enable absorption of relative displacement between said first and second chambers.

40. (Amended) An apparatus according to Claim 39, further comprising a gas discharging mechanism for providing a reduced pressure ambience in said chambers.

41. (Amended) An apparatus according to Claim 39, wherein the inside ambience of said chambers is replaced by an inactive gas.

42. (Amended) An apparatus according to Claim 39, wherein, after the reduced pressure ambience is produced in said chambers by said gas discharging mechanism, an inactive gas is supplied into said chambers and, then, a reduced pressure ambience is produced therein again by said gas discharging means.

43. An apparatus according to Claim 39, wherein said movable member comprises a bellows.

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44. (Amended) An exposure apparatus comprising:

an optical system, having a plurality of optical elements, including a reflection member for deflecting an optical axis of said optical system, and a plurality of refraction members; and

gas supplying means for supplying a gas to a space separated by the plurality of optical elements, wherein, in a space separated by two refraction members of said plurality of refraction members and containing said reflection member, a line connecting a vent hole for supplying a gas to the space and a vent hole for discharging the gas from the space intersects an optical axis of said optical system, as viewed from a direction orthogonal to the optical axes of said two refraction members.

45. (Amended) An apparatus according to Claim 44, wherein the line intersects the optical axis of said optical system twice, as viewed from a direction orthogonal to the optical axes of said two refraction members.

46. (Amended) An apparatus according to Claim 44, wherein the gas is an inactive gas.

47. An apparatus according to Claim 44, wherein the inactive gas is one of nitrogen gas and helium gas.

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48. An apparatus according to Claim 44, wherein the light source emits light of a wavelength in a vacuum ultraviolet region.

49. (Amended) An apparatus according to Claim 44, wherein the light source comprises one of an F₂ laser and an Ar₂ laser.

50. An apparatus according to Claim 44, wherein said optical system is at least one of an illumination optical system and a projection optical system.

51. (Amended) An apparatus according to Claim 44, wherein said optical system includes one of a catadioptric system and a catoptric system.

52. (Amended) A device manufacturing method, comprising the steps of:

providing an exposure apparatus as recited in Claim 1;

applying a photosensitive material to a wafer;

exposing the wafer by use of the exposure apparatus; and

developing the exposed wafer.

53. (Amended) A semiconductor manufacturing factory, comprising:

a production machine group including an exposure apparatus as recited in Claim 1;

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a local area network for connecting the production machine group; and
a gateway for enabling access from the local area network to an external network
outside said factory,

wherein information related to at least one production machine in said production
machine group is data communicated.

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54. (Amended) A maintenance method for an exposure apparatus as recited in Claim 1
and being placed in a semiconductor manufacturing factory, said method comprising the steps of:

preparing a maintenance database connected to an outside network of the factory,
wherein the database can be prepared by a user or a vendor of the exposure apparatus;
admitting access to the maintenance database through the outside network, from
the factory; and
transmitting maintenance information stored in the maintenance database to the
factory through the outside network.

Please ADD new claims 55-72 as follows:

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-- 55. A device manufacturing method, comprising the steps of:

providing an exposure apparatus as recited in Claim 14;
applying a photosensitive material to a wafer;
exposing the wafer by use of the exposure apparatus; and
developing the exposed wafer.

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56. A semiconductor manufacturing factory, comprising:

a production machine group including an exposure apparatus as recited in Claim 14;

a local area network for connecting the production machine group; and

outside said factory,

wherein information related to at least one production machine in said production machine group is data communicated.

57. A maintenance method for an exposure apparatus as recited in Claim 14 and being placed in a semiconductor manufacturing factory, said method comprising the steps of:

preparing a maintenance database connected to an outside network of the factory, wherein the database can be prepared by a user or a vendor of the exposure apparatus;

admitting access to the maintenance database through the outside network, from the factory; and

transmitting maintenance information stored in the maintenance database to the factory through the outside network.

58. A device manufacturing method, comprising the steps of:

providing an exposure apparatus as recited in Claim 22;

applying a photosensitive material to a wafer;

exposing the wafer by use of the exposure apparatus; and developing the exposed wafer.

59. A semiconductor manufacturing factory, comprising:

a production machine group including an exposure apparatus as recited in Claim

a local area network for connecting the production machine group; and

a gateway for enabling access from the local area network to an external network

said factory,

wherein information related to at least one production machine in said production
e group is data communicated.

60. A maintenance method for an exposure apparatus as recited in Claim 22 and being placed in a semiconductor manufacturing factory, said method comprising the steps of:

preparing a maintenance database connected to an outside network of the factory, wherein the database can be prepared by a user or a vendor of the exposure apparatus;

admitting access to the maintenance database through the outside network, from the factory; and

transmitting maintenance information stored in the maintenance database to the factory through the outside network.

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61. A device manufacturing method, comprising the steps of:
providing an exposure apparatus as recited in Claim 24;
applying a photosensitive material to a wafer;
exposing the wafer by use of the exposure apparatus; and
developing the exposed wafer.
62. A semiconductor manufacturing factory, comprising:
a production machine group including an exposure apparatus as recited in Claim 24;
a local area network for connecting the production machine group; and
a gateway for enabling access from the local area network to an external network outside said factory,
wherein information related to at least one production machine in said production machine group is data communicated.
63. A maintenance method for an exposure apparatus as recited in Claim 24 and being placed in a semiconductor manufacturing factory, said method comprising the steps of:
preparing a maintenance database connected to an outside network of the factory,
wherein the database can be prepared by a user or a vendor of the exposure apparatus;
admitting access to the maintenance database through the outside network, from the factory; and

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transmitting maintenance information stored in the maintenance database to the factory through the outside network.

64. A device manufacturing method, comprising the steps of:

providing an exposure apparatus as recited in Claim 34;

applying a photosensitive material to a wafer;

exposing the wafer by use of the exposure apparatus; and

developing the exposed wafer.

65. A semiconductor manufacturing factory, comprising:

a production machine group including an exposure apparatus as recited in Claim

34;

a local area network for connecting the production machine group; and

a gateway for enabling access from the local area network to an external network

outside said factory,

wherein information related to at least one production machine in said production machine group is data communicated.

66. A maintenance method for an exposure apparatus as recited in Claim 34 and being placed in a semiconductor manufacturing factory, said method comprising the steps of:

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preparing a maintenance database connected to an outside network of the factory,
wherein the database can be prepared by a user or a vendor of the exposure apparatus;
admitting access to the maintenance database through the outside network, from
the factory; and
transmitting maintenance information stored in the maintenance database to the
factory through the outside network.

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67. A device manufacturing method, comprising the steps of:
providing an exposure apparatus as recited in Claim 39;
applying a photosensitive material to a wafer;
exposing the wafer by use of the exposure apparatus; and
developing the exposed wafer.
68. A semiconductor manufacturing factory, comprising:
a production machine group including an exposure apparatus as recited in Claim
39;
a local area network for connecting the production machine group; and
a gateway for enabling access from the local area network to an external network
outside said factory,
wherein information related to at least one production machine in said production
machine group is data communicated.

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69. A maintenance method for an exposure apparatus as recited in Claim 39 and being placed in a semiconductor manufacturing factory, said method comprising the steps of:

preparing a maintenance database connected to an outside network of the factory, wherein the database can be prepared by a user or a vendor of the exposure apparatus; admitting access to the maintenance database through the outside network, from the factory; and transmitting maintenance information stored in the maintenance database to the factory through the outside network.

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70. A device manufacturing method, comprising the steps of:

providing an exposure apparatus as recited in Claim 44; applying a photosensitive material to a wafer; exposing the wafer by use of the exposure apparatus; and developing the exposed wafer.

71. (Amended) A semiconductor manufacturing factory, comprising:

a production machine group including an exposure apparatus as recited in Claim 44; a local area network for connecting the production machine group; and a gateway for enabling access from the local area network to an external network outside said factory,